Phase Three:
Data Collection and Analyses

Data Analysis Report

Total Maximum Daily Loads for Nitrate in Santa Maria River and Oso Flaco Creek watersheds, Santa Barbara County, California

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CONTENTS

TABLES

FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

CEQA	California Environmental Quality Act
CCAMP	Central Coast Ambient Monitoring Program
GIS	Geographic Information System
MEP	Maximum Extent Practicable
MRLC	Multi-Resolution Land Characterization
MS4s	Municipal Separate Storm Sewer Systems
MUN	Municipal and domestic water supply
NPDES	National Pollutant Discharge Elimination System
QAPP	Quality Assurance Project Plan
SSO	Site-Specific Objective
TMDL	Total Maximum Daily Load
USGS	United States Geologic Survey
Water Board	Regional Water Quality Control Board (Region 3)
WDR	Waste Discharge Requirements
WWTP	Waste Water Treatment Plant

1. PROJECT DEFINITION

This report addresses impairment of Oso Flaco Lake, Oso Flaco Creek and its tributary, Little Oso Flaco Creek, and the Santa Maria River and its tributaries, Main Street Canal and Orcutt-Solomon Creek. Each of these water bodies, with the exception of Little Oso Flaco Creek, is specifically identified on the 303(d) list for nitrate.

This report was prepared in the context of numerous existing efforts occurring on multiple land uses and regulatory mechanisms aimed at reducing nitrate loading.

This report represents the final deliverable for Phase 3 of the Process for Addressing Impaired Waters in California (June 2005). The information contained in this report will be used as the foundation for development of a Final Preliminary Project Report, the final deliverable for Phase 4, scheduled to be completed in November 2006.

2. WATERSHED DESCRIPTION

The Santa Maria and Oso Flaco watersheds are located in Northwestern Santa Barbara County and Southwestern San Luis Obispo County, California. The watersheds are about 50 miles north of Point Conception and about 150 miles south of Monterey Bay on the central California coast. The climate is mild with 14 inches average rainfall a year.

The area is a broad alluvial plain near the ocean, tapering gradually inland. Upland or mesa areas, foothills, and mountain complexes further define the alluvial plain boundary.

The Santa Maria Valley groundwater basin extends south from the Nipomo Mesa to the Orcutt Uplands. The Santa Maria groundwater basin is divided into five sub-basins: the Santa Maria, Orcutt, Nipomo, and Upper and Lower Guadalupe sub-basins. The Upper

Guadalupe sub-basin constitutes the upper unconfined portion of the sub-basin and the Lower-Guadalupe is a deeper confined aquifer separated from the upper sub-basin by clay layers. Coarse-grained alluvial channel deposits in the river grade to finer silt and clay flood deposits as distance from the river channel increases.

Staff concluded that the primary land uses were rangeland, irrigated agriculture, and urban lands. Figure 1 and Figure 2 show the locations of the watersheds, major water bodies and monitoring stations. Little Oso Flaco Creek (not shown in Figure 2) drains to Oso Flaco Creek from the East. Main Street Canal (also not identified in Figure 2) flows into the Santa Maria River from the south.

Figure 1. Watersheds, Major Water bodies and CCAMP Monitoring Locations in the Upper Santa Maria Watershed.

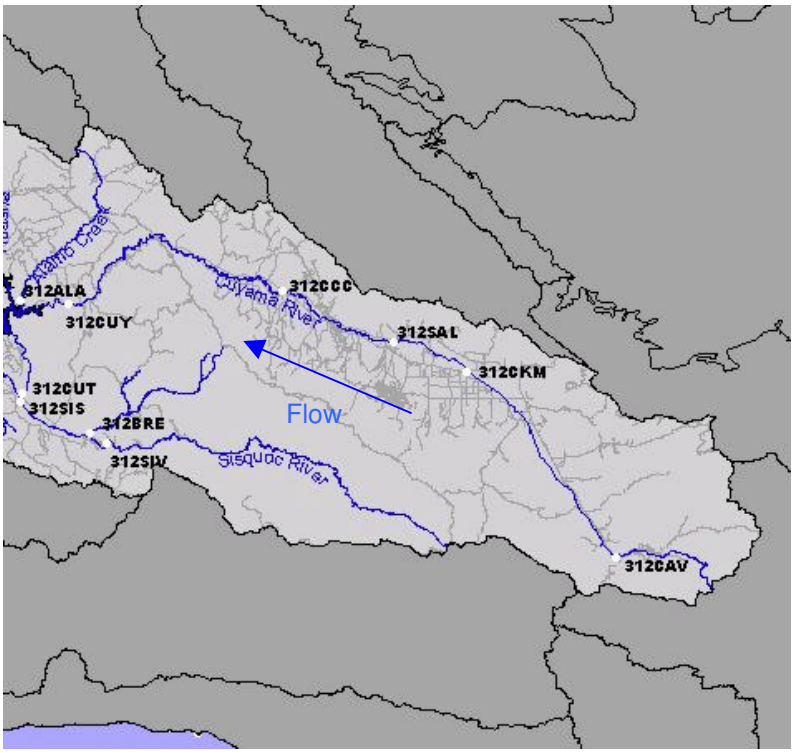
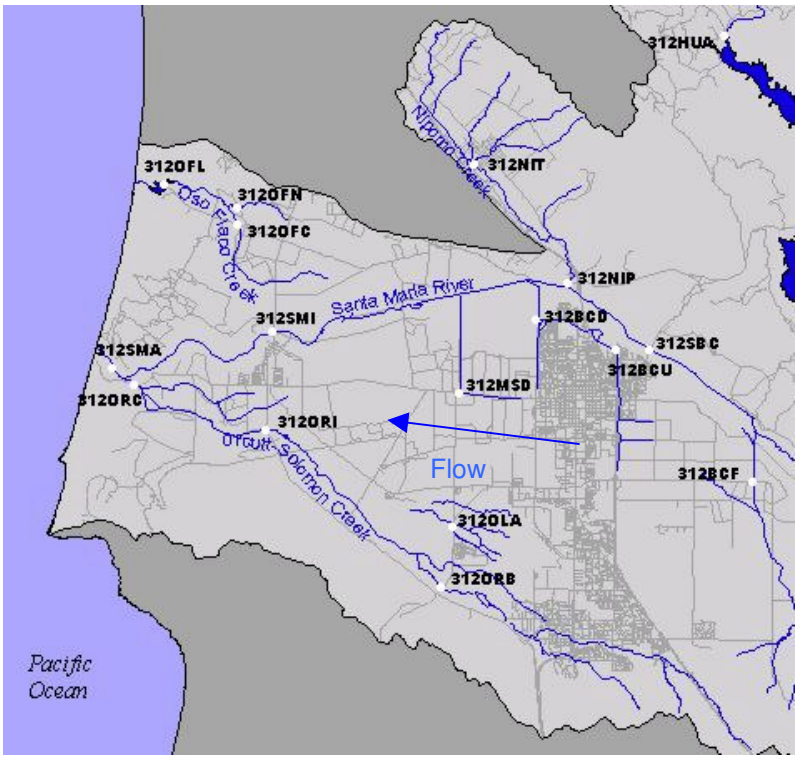


Figure 2. Watersheds, Major Water bodies and CCAMP Monitoring Locations in the Lower Santa Maria Watershed and Oso Flaco Watershed.



2.1. Beneficial Uses

The Central Coast Regional Water Quality Control Board (Water Board) is responsible for protecting water resources from pollution and nuisance that may occur as a result of waste discharges. The Water Board determines beneficial uses that need protection and adopts water quality objectives that are necessary to protect the beneficial water uses in the *Water Quality Control Plan* (Basin Plan).

The beneficial uses associated with drinking water and irrigation water for sensitive crops are the principal water quality considerations with respect to nitrate. Elevated levels of nitrate are unsafe for municipal and drinking water supply (MUN) uses.

The Basin Plan specifically identifies beneficial uses for some of the listed water bodies included in this analysis. The Santa Maria River, Orcutt Creek, and Oso Flaco Creek have designated beneficial uses in the Basin Plan. The beneficial uses cited in the Basin Plan are listed in Table 1. Staff interpreted Orcutt Creek as being synonymous with Orcutt-Solomon Creek.

The Basin Plan states surface water bodies within the Region that do not have beneficial uses designated for them are assigned the beneficial uses of "municipal and domestic water supply" and "protection of both recreation and aquatic life." Staff interpreted this general statement of beneficial uses to encompass the specific beneficial uses of water contact and non-contact recreation, municipal and domestic supply, and warm fresh water habitat. Main Street Canal and Little Oso Flaco Creek are not specifically listed in the Basin Plan and therefore are designated with those beneficial uses.

Oso Flaco Lake is not designated as supporting the municipal and domestic supply beneficial use. As such, staff proposed that Oso Flaco Lake be removed from the 303(d) list of impaired water bodies (for nitrate) as part of the 2006 list update (in progress).

Table 1. Beneficial uses for Santa Maria River and Oso Flaco water bodies.

Water body	Santa Maria River	Orcutt Creek	Oso Flaco Creek	Oso Flaco Lake
Municipal and Domestic Supply (MUN).	X	X	X	
Agricultural Supply (AGR)	X	X	X	
Industrial Process Supply (PROC)				
Industrial Service Supply (IND)	X			
Ground Water Recharge (GWR)	X	X	X	X
Water Contact Recreation (REC-1)	X	X	X	X
Non-Contact Water Recreation (REC-2)	X	X	X	X
Wildlife Habitat (WILD)	X	X	X	X
Cold Fresh Water Habitat (COLD)	X	X		
Warm Fresh Water Habitat (WARM)	X		X	X
Migration of Aquatic Organisms (MIGR)	X			

Spawning, Reproduction, and/or Early Development (SPWN)				X
Preservation of Biological Habitats of Special Significance (BIOL)			X	X
Rare, Threatened, or Endangered Species (RARE)	X	X	X	X
Estuarine Habitat (EST)		X		
Freshwater Replenishment (FRSH)	X	X	X	
Navigation (NAV)				X
Hydropower Generation (POW)				
Commercial and Sport Fishing (COMM)	X	X	X	X
Aquaculture (AQUA)				
Inland Saline Water Habitat (SAL)				
Shellfish Harvesting (SHELL)				

2.2. Water Quality Objectives

The water quality objective for nitrates in the Basin Plan that directly applies to the TMDL is as follows:

- The municipal drinking water supply beneficial use is protected by the numeric water quality objective of 10 mg/L maximum for nitrate (as N).

2.3. Waste Discharge Prohibitions

The Regional Board can prohibit specific types of discharges to certain areas (California Porter-Cologne Water Quality Control Act Section 13243). These discharge prohibitions may be revised, rescinded, or adopted as necessary. Discharge prohibitions are described in pertinent sections of Chapter Four, "Implementation Plan" and Chapter Five, "Plans and Policies" in the Regional Board Discharge Prohibition Section.

The following information is contained in the Basin Plan, and relates to the nitrate TMDLs:

Santa Maria River Waste Discharge Prohibition

Waste discharges to the following inland waters are prohibited: Santa Maria River downstream from the Highway One bridge.

Nipomo individual sewage disposal systems

Failing individual on-site sewage disposal systems in the community of Nipomo resulted in a treatment facility being completed in 1987. Treatment is by aerated lagoons and disposal is by percolation beds. Sewer service is provided to downtown Nipomo and County operated sewer systems of Nipomo Palms, Black Lake Estates, and Galaxy Subdivisions. The recommended plan is to extend the sewer system to small lot areas as growth allows.

Wastewater Management Plans should be prepared and implemented for urbanizing and high-density areas, including Nipomo.

In order to achieve water quality objectives, protect present and future beneficial water uses, protect public health, and prevent nuisance, discharges are prohibited in the following areas: Discharges from individual sewage disposal systems are prohibited in portions of the community of Nipomo, San Luis Obispo County, which are particularly described in Appendix A-27 of the Basin Plan.

2.4. Problem Statement

Oso Flaco Creek, the Santa Maria River and listed tributaries and drainages are on the 2002 Clean Water Act (CWA) Section 303(d) List of Water Quality Limited Segments (the 303(d) list) because nitrate levels exceeded the municipal and domestic water quality objective. Water Board staff previously used water quality data collected by the Central Coast Ambient Monitoring Program (CCAMP) to recommend inclusion on the 303(d) list. The results of CCAMP data collection, along with additional data collected in these watersheds are discussed in Section 4 Data Analysis.

3. NUMERIC TARGET

The municipal drinking water supply beneficial use is protected by the numeric water quality objective of 10 mg/l-N maximum for nitrate. The proposed numeric target for this project is consistent with this water quality objective.

4. DATA ANALYSIS

4.1. Water Quality Data Analysis

Staff relied on data collected by the following entities or programs in preparing this report:

a. Central Coast Ambient Monitoring Program
b. Storm Water Program Monitoring
c. Orcutt-Solomon Creek storm event monitoring
e. Cachuma Resource Conservation District Report
d. Oso Flaco Nitrate Study
f. Santa Maria Estuary Enhancement and Management Plan
g. Permitted Facility Monitoring
h. Santa Maria Valley Groundwater Basin Data
i. Department of Health Services Groundwater Data
j. Santa Maria Basin Oil Field Assessment
k. Santa Maria Oil Refinery
l. Santa Maria Sanitary Landfill
m. TMDL Monitoring
n. Case Study: Rangeland management measure implementation monitoring

The following discussion summarizes the monitoring activities and results from these efforts.

a. Central Coast Ambient Monitoring Program

The Water Board's Central Coast Ambient Monitoring Program (CCAMP) conducted monthly monitoring in 2000 and 2001. Monthly water quality monitoring continued at the Santa Maria River site at Rancho Guadalupe Dunes Preserve through August 2003. Figure 1 and Figure 2 show the locations of the water bodies and sampling sites. Table 2 shows the names of the sampling sites. Figure 3 shows the mean and range of data collected at each site in the Santa Maria hydrologic unit area. Sites are displayed in order of decreasing mean.

Water Board staff utilized water quality data collected by CCAMP to determine where water quality objectives were exceeded. Staff determined the Santa Maria River, Main Street Canal, Orcutt-Solomon Creek, Oso Flaco Creek and Little Oso Flaco Creek exceeded the municipal and domestic water supply (MUN) water quality objective for nitrate.

Table 2. CCAMP Monitoring Locations In The Santa Maria And Oso Flaco Watersheds

Water body	Site name	Site location
Alamo Creek	312ALA	312ALA-Alamo Creek at Alamo Creek Road
Blosser Channel	312BCD	312BCD-Blosser Channel d/s of groundwater recharge ponds
Bradley Canyon Creek	312BCF	312BCF-Bradley Canyon diversion channel @ Foxen Canyon Road
Bradley Channel	312BCU	312BCU-Bradley Channel u/s of ponds @ Magellan Drive
LaBrea Creek	312BRE	312BRE-LaBrea Creek u/s Sisquoc River
Cuyama River (above res.)	312CAV	312CAV-Cuyama River @ Highway 33
Cuyama River (above res.)	312CCC	312CCC-Cuyama River d/s Cottonwood Canyon
Cuyama River (above res.)	312CUL	312CUL-Cuyama River above Lockwood turnoff
Cuyama River (below res.)	312CUT	312CUT-Cuyama River below Twitchell @ White Rock Lane
Cuyama River (above res.)	312CUY	312CUY-Cuyama River d/s Buckhorn Road
Huasna River	312HUA	312HUA-Husana River @ Huasna Townsite Road
Main Street Canal	312MSD	312MSD-Main Street Canal u/s Ray Road @ Highway 166
Nipomo Creek	312NIP	312NIP-Nipomo Creek @ Highway 166
Nipomo Creek	312NIT	312NIT-Nipomo Creek @ Tefft Street
Oso Flaco Creek	312OFC	312OFC-Oso Flaco Creek @ Oso Flaco Lake Road
Oso Flaco Lake	312OFL	312OFL-Oso Flaco Lake @ culvert
Little Oso Flaco Creek	312OFN	312OFN-Little Oso Flaco Creek
Betteravia Lakes	312OLA	312OLA-Betteravia Lakes at Black Road
Orcutt Solomon Creek	312ORB	312ORB-Orcutt Solomon Creek @ Black Road
Orcutt Solomon Creek	312ORC	312ORC-Orcutt Solomon Creek u/s Santa Maria River
Orcutt Solomon Creek	312ORI	312ORI-Orcutt Solomon Creek @ Highway 1
Salisbury Creek	312SAL	312SAL-Salisbury Creek @ Branch Canyon Wash
Santa Maria River	312SBC	312SBC-Santa Maria River @ Bull Canyon Road
Sisquoc River	312SIS	312SIS-Sisquoc River @ Santa Maria Way
Sisquoc River	312SIV	312SIV-Sisquoc River u/s Tepusquet Road
Santa Maria River	312SMA	312SMA-Santa Maria River @ Rancho Guadalupe Dunes Preserve
Santa Maria River	312SMI	312SMI-Santa Maria River @ Highway 1

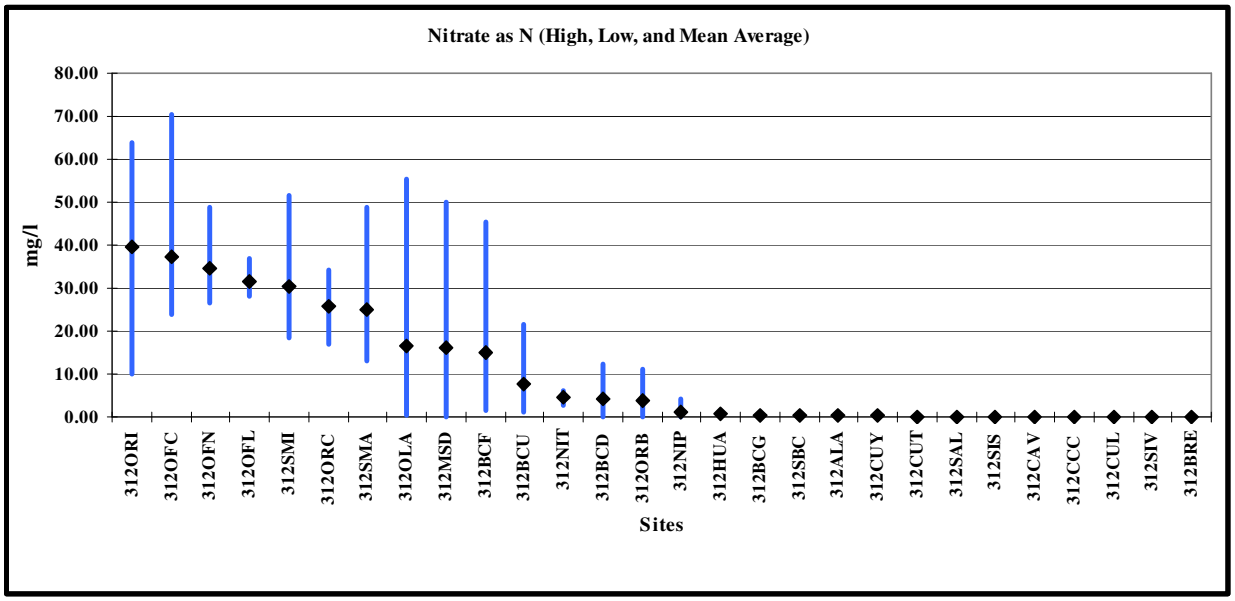


Figure 3. CCAMP Monitoring Data In The Santa Maria And Oso Flaco Watersheds

Santa Maria River (including Main Street Canal)

CCAMP staff collected samples in the Santa Maria River at Highway 1 (SMI) and further downstream at Rancho Guadalupe Dunes Preserve Road (SMA) between January 2000 and February 2001. Sampling at SMA is continuous on a monthly basis through CCAMP's Coastal Confluences project; data for this site is shown through May 2005 in Figure 4. Staff also collected samples between January 2000 and February 2001 in Main Street Canal, a storm water conveyance and agricultural drainage that flows to percolation ponds and then ultimately to the Santa Maria River.

Concentrations found at SMI were higher and more variable than those found downstream at SMA during 2000-01. Nitrate concentrations along the Santa Maria River appear to be higher during the dry season, although exceedances were found during every month of the year.

Concentrations at the Main Street Canal upstream of Ray Road at Highway 166 (MSD) were lower than those found in the Santa Maria River, but were still elevated above the nitrate water quality objective during numerous samples collected throughout the year. The units on the "y" axis of the graph in Figure 4 are mg/L.

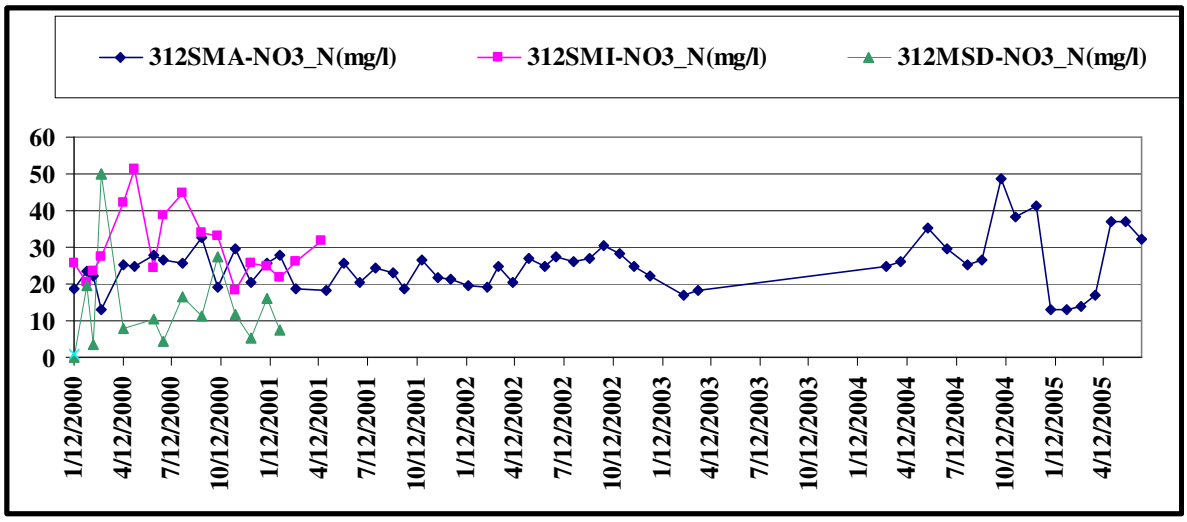


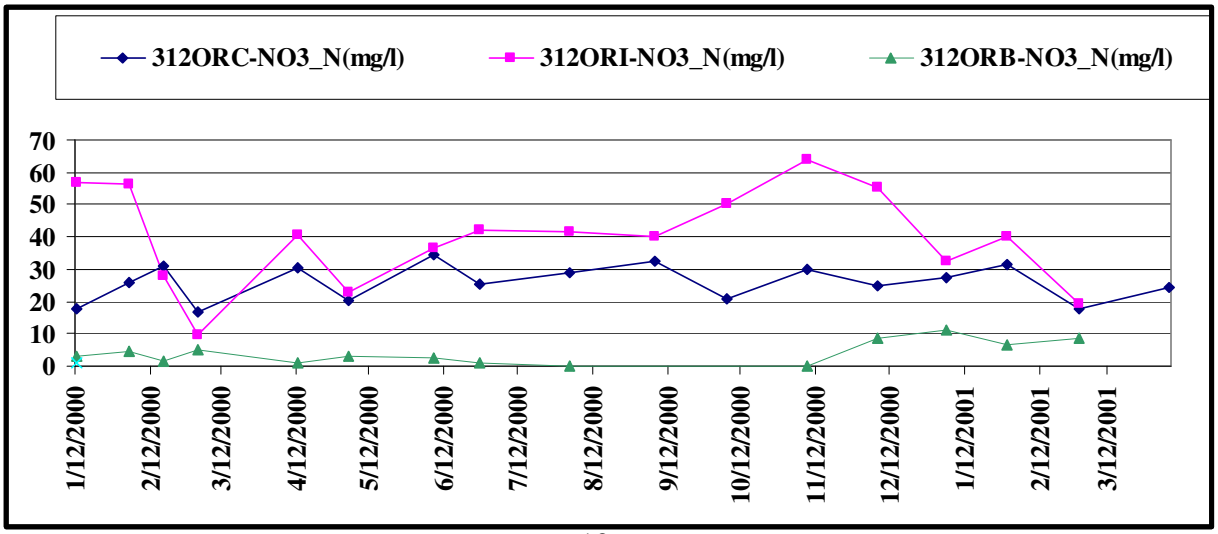
Figure 4. Nitrate Concentrations In The Santa Maria River At Highway 1 (SMI), Santa Maria River At Rancho Guadalupe Dunes Preserve Road (SMA), And Main Street Canal (MSD) January 2000 To May 2005.

Orcutt-Solomon Creek

CCAMP staff collected samples at Orcutt-Solomon Creek between January 2000 and March 2001. Nitrate concentrations at three sites are displayed in Figure 5. The units on the "y" axis of the graph are mg/L. Concentrations were higher and more variable at Highway 1 (ORI), than further downstream at the Rancho Guadalupe Dunes Preserve Road (ORC). Levels exceeded the water quality objective at both ORI and ORC year-round.

Staff does not consider the most upstream site on Orcutt-Solomon Creek at Black Road (ORB), a low flowing drainage, as impaired, as it exhibited low nitrate levels year-round. Staff collected data at Betteravia Lakes at Black Road (OLA), but did not consider the data to be representative due to lack of flow. As such, data are not shown in the Figure.

Figure 5. Nitrate concentrations in Orcutt-Solomon Creek at ORC, ORI, and ORB January 2000 to March 2001.



Oso Flaco Creek and Oso Flaco Lake

CCAMP staff collected samples in the Oso Flaco watershed between January 2000 and April 2001. The units on the "y" axis of the graph are mg/L. Nitrate concentrations are displayed in Figure 6. Concentrations at all sites were elevated above water quality objectives year round. Concentrations at Oso Flaco Creek at Oso Flaco Creek Road (OFC) were more variable than those measured at Little Oso Flaco Creek (OFN) and Downstream at Oso Flaco Lake (OFL).

Little Oso Flaco Creek is not specifically listed as impaired on the 303(d) list. Staff concluded that both Oso Flaco Creek and its tributary, Little Oso Flaco Creek were impaired. As such, TMDLs will be developed for both water bodies. Oso Flaco Lake is on the 303(d) list, but is not designated as supporting the municipal use and as such, staff will not develop a nitrate TMDL for this water body.

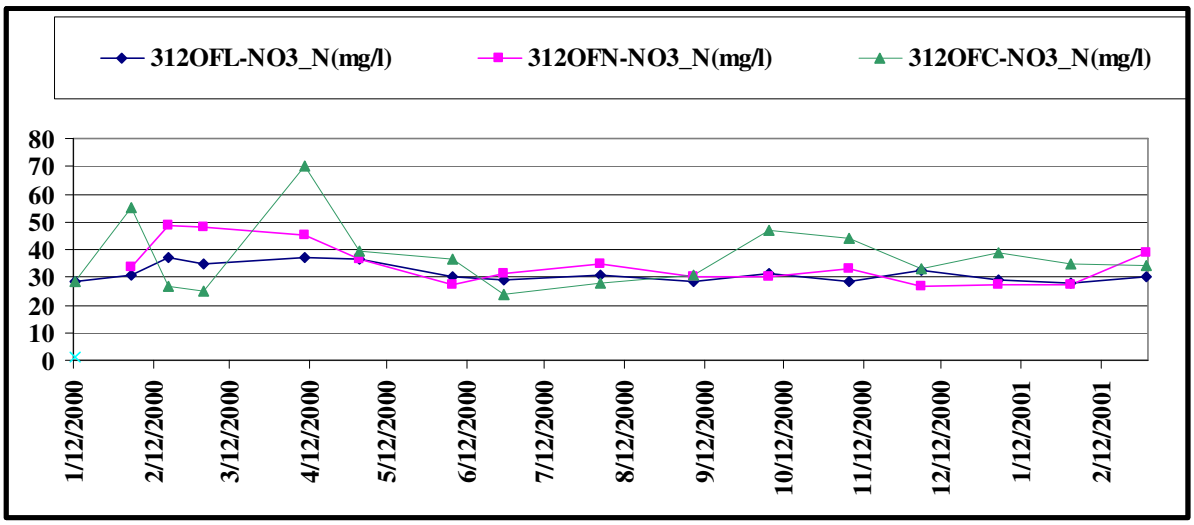


Figure 6. Nitrate Concentrations In Oso Flaco Watershed January 2000 To March 2001

b. Storm Water Program Monitoring

The Water Board will be regulating storm water discharge through the issuing of National Pollution Discharge Elimination Permits (NPDES) storm water discharge permits to several municipalities in the Santa Maria and Oso Flaco watersheds. Some municipalities are monitoring surface and runoff quality as part of their proposed permit activities.

The City of Santa Maria began collecting data during storm events in 2004. Nitrate concentrations measured in urban runoff from the City of Santa Maria did not exceed water quality objectives. Nitrate levels in the North Channel of the Main Street Canal, which received more agricultural inputs, were higher (37 mg/L) than those measured elsewhere. Figure 7, Figure 8 and Figure 9 show the monitoring locations. Table 3 shows a summary of nitrate concentrations collected between 2004 and 2006. The stations, primary land uses, number of samples (n), minimum, average, and maximum values are shown in the table. The City plans to continue storm water monitoring efforts indefinitely, with a minimum of three sampling events per wet season. Additional sampling will provide information to characterize urban and agricultural inputs.

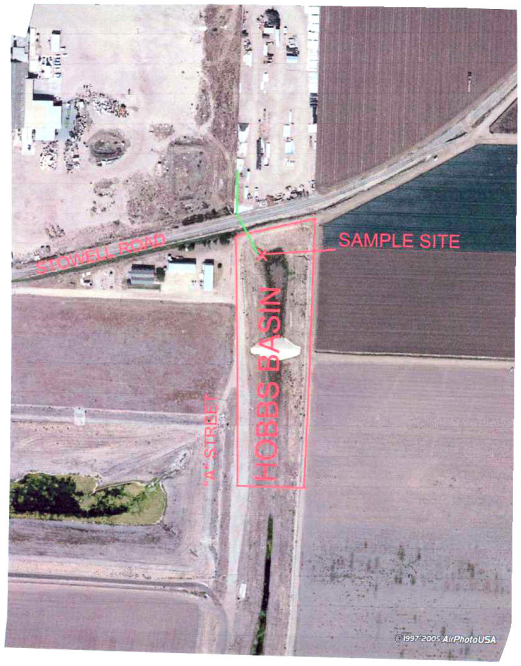


Figure 7. Location Of The Prell Basin Sampling Station Within The City Of Santa Maria

Figure 8. Location Of The Hobbs Basin Sampling Station Within The City Of Santa Maria

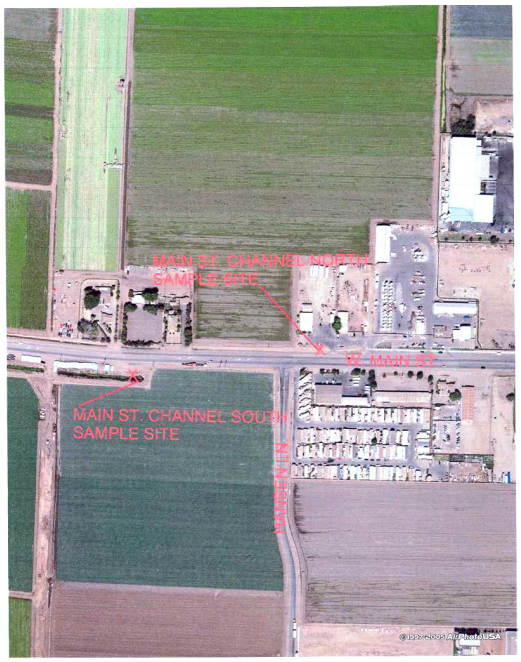


Figure 9. Location Of The Main St. Channel North And South Sampling Stations Within The City Of Santa Maria

Table 3. Summary Of Nitrate-Nitrogen Concentrations Collected By The City Of Santa Maria

Station	Drainage area primary land uses	n	Min. (mg/L)	Average (mg/L)	Max. (mg/L)
Prell Basin	Primarily runoff from irrigated agriculture; representative of flows that enter the City.	5	2.7	3.2	3.7
Hobbs Basin	Urban run off; representative of urban flows leaving the City	4	ND	1.3	1.8
Main St. North and South	Two channels (North and South) that make up the Main Street Canal discharge to the Santa Maria River; representative of urban and agriculture, with the North receiving more agricultural inputs than the South.	9	1.0	7.6	37

c. Orcutt-Solomon Creek storm event monitoring

Santa Barbara County's Project Clean Water sponsors studies to help identify pollution sources and develop an understanding of how those pollutants move through the environment. Project Clean Water staff conducted nitrate monitoring in Orcutt-Solomon Creek during four storm events between January 2001 and April 2001 at monitoring site, OR1. Figure 10 shows the monitoring locations. Of four samples collected, three had non-detectable levels of nitrate, and one sample measured 0.7 mg/L nitrate (as N). Staff also collected samples during three storm events between November 2002-February 2003 at OR1 and OR5. Nitrate levels at OR1 ranged from 3.7 to 7.7 mg/L; at OR5, levels were non-detectable. All samples were less than the nitrate water quality objective.

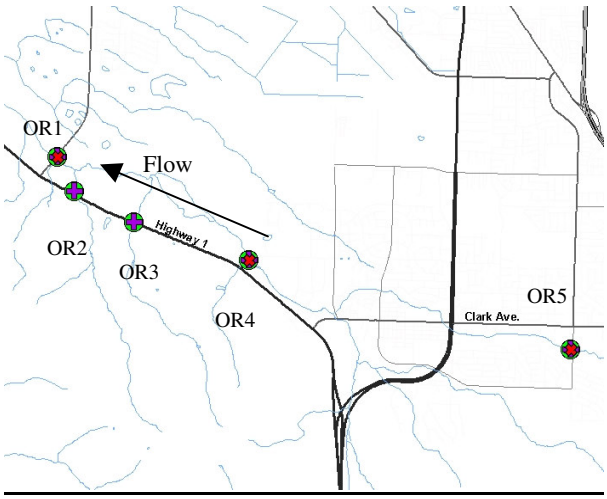


Figure 10. Project Clean Water sampling sites on Orcutt-Solomon Creek.

d. Oso Flaco Nitrate Study

The Coastal Conservancy contracted with The Dunes Center to conduct an Oso Flaco Watershed Nitrate and Sediment Assessment. Objectives of the study included developing a nitrate model. As part of this effort, the Cachuma Resources Conservation

District (CRCD) collected nitrate data in 2002-2003 at eight locations within the Oso Flaco watershed. Raw data are shown in Table 4 and summarized in Table 5. Urban storm water discharges from the rural residential area of Nipomo Mesa to Oso Flaco watershed did not exceed water quality objectives; runoff did not occur during dry periods. Samples taken from Oso Flaco Creek, and Little Oso Flaco Creek exceeded water quality objectives, but were typically less than samples taken from agricultural ditches. Irrigated agricultural discharges occurred during both wet and dry seasons.

Table 4. Nitrate (As N) Values From Agricultural Drainage Sites In Oso Flaco Creek Watershed

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8
	Urban	Bonita/ Divisi.	Division/ Culvert	Highway 1/ OFLRd	RR/OFLRd	Crk/OFLR	LOFC/RR	OFL/ Causeway
06/12/02	2	113	154	77	43	41	18	51
07/10/02	2	96	89	9	12	50	44	38
07/24/02	ns	13	12	25	ns	47	42	37
08/06/02	3	80	34	40	20	25	32	30
08/20/02	ns	120	99	34	ns	36	29	29
09/11/02	ns	63	47	21	38	36	35	32
10/09/02	ns	76	66	44	19	51	41	34
11/13/02	ns	ns	ns	111	56	65	53	40
12/10/02	ns	72	102	10	17	31	38	41
01/15/03	ns	85	101	50	37	65	41	40
02/20/03	ns	ns	ns	ns	ns	34	43	38
03/11/03	ns	61	108	34	15	29	38	29
04/29/03	ns	65	ns	ns	ns	29	38	29
05/29/03	ns	89	95	11	20	41	47	50
06/30/03	ns	137	ns	86	40	65	76	52
Average	2	82	82	42	29	43	41	38

ns: no sample taken

Table 5. CRCD Monitoring Locations And Data Summary In The Oso Flaco Watershed

Station (s)	Primary land use/location within drainage area	No.	Min. (mg/L)	Average (mg/L)	Max. (mg/L)
Site 1	Urban runoff from Nipomo Mesa via storm water collection system on Division Road; stagnant flow	3	2	2	3
Site 2	County Road Ditch Culvert Outlet. Intersection of Bonita School Road and Division Rd. West of BSRd, South side of Division.	13	13	82	137
Site 3	Ag Ditch Coming from County Road Ditch Culvert Outlet. North Side of Division Rd. Approximately 4,650 feet west /south west of the split in the road of Division and Oso Flaco Lake Road.	11	12	82	154
Site 4	County Road Ditch. Intersection of Highway 1 and Oso Flaco Lake Road. Southwest Quadrant. West of Highway 1 and south of Oso Flaco Lake Road.	13	9	42	111
Site 5	County Road Ditch along Oso Flaco Lake Road, just west of the railroad tracks. South of Oso Flaco Lake Road.	11	12	26	56

Site 6	Oso Flaco Creek just north of Oso Flaco Lake Road.	15	25	43	65
Site 7	Little Oso Flaco Creek just west of the train trestle.	15	18	41	76
Site 8	At the causeway at Oso Flaco Lake. Downstream end of two culverts.	15	29	38	52

e. Cachuma Resource Conservation District Report

The CRCD summarized water quality issues in the Santa Maria River in the Santa Maria River Watershed Non-Point Source Pollution Management Plan (CRCD, 2000). This report focused on non-point source pollution including nutrients, and also provided an overview of methods to address water quality degradation and improvement for agricultural and urban uses, and ecological functions. Also included in the CRCD's report was an assessment of the effectiveness, feasibility, and landowner willingness to implement measures to improve water quality, availability of funding sources, and a summary of local, State and Federal permit and California Environmental Quality Act (CEQA) requirements.

f. Santa Maria Estuary Enhancement and Management Plan

The State Coastal Conservancy prepared the Santa Maria Estuary Enhancement and Management Plan (Plan) in March 2004. The Plan identified existing conditions of, and stresses to, the natural resources, recommended enhancement or management measures, suggested alternative land use practices, and developed a comprehensive monitoring program to allow for adaptive resource management and plan element modification over time. The actions described by the Plan were developed with stakeholder input, including interested private landowners and project area lessees, with the understanding that implementation would be voluntary. The Plan acknowledged the benefits of advanced planning and implementation of water quality improvement measures prior to regulatory requirements associated with future TMDLs. The Plan also identified actions (agricultural practices, urban storm water runoff, water quality monitoring) to be considered for the TMDL implementation plan.

Plan development included agricultural outreach interviews (conducted by the Dunes Center) to gather information on cultivated agricultural and cattle grazing practices.

The Plan also included water quality data collection, focused on nitrate inputs. Table 6 provides a data summary for this study; for additional information see reports in the *SMRE* Plan, Appendix B dated March 12, 2001 and October 23, 2002.

Table 6. Nitrate as N Measurements from the *SMRE* Study

November, 2001[a]	
Sampling location	Nitrate as N (mg/L)
Hwy 1	8.3 - 8.8
Lagoon	18 - 22
May, 2002[b]	
Hwy 1	9.6
8th Street	10.6
Ditch near Kiosk	28.1
Orcutt Creek	20.9
Lagoon	16.2

[a] Data from 2 daytime samples taken on 10/31 and 11/20, 2001 (MNE Letter Report dated March 12, 2002 (Appendix B).
[b] Mean data for 6 samples taken every 6 hours for 36 hours May 22 and 23 (graphs in MNE Letter Report dated October 25, 2002 (Appendix B).

According to the Plan, the nitrate concentrations measured at Highway 1 were lower than samples collected from the estuary, which was likely due to substantial nutrient input from Orcutt-Solomon Creek combined with the drainage ditch near the kiosk to Rancho Guadalupe Dunes Preserve. Together these sources accounted for about 96% of the nitrate input to the estuary (Appendix B, MNE report dated February 28, 2002).

The Plan also developed a water budget in the estuary and determined it was substantially affected by input from Solomon-Orcutt Creek and the drainage ditch near the kiosk. Combined, these two sources accounted for approximately 92% of the total inflow to the estuary. Water level rises in the estuary following rainfall when the barrier berm has not been breached and the rate of inflow (from upstream) exceeds the length and rate of seepage through the barrier berm to the ocean (about 0.8 cubic m/sec).

g. Permitted Facility Monitoring

The Water Board issues Waste Discharge Requirements (WDRs) for several facilities in the Santa Maria and Oso Flaco watersheds. Several of the facilities in the Santa Maria watershed (City of Santa Maria, City of Guadalupe, Laguna County Sanitation District, and Nipomo Community Services District wastewater treatment plants) collect water quality data as part of their permit coverage.

Staff evaluated available effluent, surface and groundwater nitrate data collected by the facilities. The Nipomo Community Services District analyzes samples for total nitrogen rather than for nitrate; staff included this data in the table. A summary of all data is shown in Table 7.

As shown in Table 7, effluent and groundwater concentrations measured by the City of Santa Maria were below water quality objectives. Effluent and groundwater concentrations measured by the City of Guadalupe were below water quality objectives, with the exception of levels measured upgradient of the wastewater spray field, which rose dramatically in 1998. As a result, the Water Board recently required the City of Guadalupe perform a hydrogeological evaluation of the representative nature of the well and install new one if needed.

Staff evaluated nitrate concentrations measured by the Laguna County Sanitation District in 2003 and 2005. Groundwater concentrations were below 10 mg/l with the exception of one sample collected downgradient in 2005. All effluent samples were below 10 mg/L with the exception of one sample collected in April 2003. Surface water samples collected in Orcutt-Solomon Creek were higher downgradient of the wastewater treatment plant than upgradient.

Nipomo Community Services District measures nitrogen, rather than nitrate, as shown in Table 7. They are currently evaluating sub-surface flow in order to draw definitive conclusions regarding the impact of effluent percolation to area groundwater.

Table 7. Summary Of Nitrate-Nitrogen Concentrations Collected By The WWTPs

Facility	Period of data reviewed	Sampling frequency and location	N	Min. (mg/L)	Average (mg/L)	Max. (mg/L)
City of Santa Maria	2002-2004	Annual Effluent	3	0.5	4.0	7.9
		Quarterly Groundwater (upgradient)	12	<1.0	n/a [1]	<5.0
		Quarterly Groundwater (downgradient)	24	<0.5	n/a [1]	<5.2
City of Guadalupe	1994-2004	Annual Groundwater (upgradient) 1994-1996	5	<0.1	0.4	1.8
		Annual Groundwater (downgradient) 1994-1996	5	<0.1	0.2	<0.5
		Annual Groundwater (upgradient) 1998-2004	5	100	118	140
		Annual Groundwater (downgradient) 1998-2004	5	<0.1	0.2	0.2
Laguna County Sanitation District	2003; 2005	Annual Groundwater (upgradient)	6	0.2	3.3	9
		Annual Groundwater (downgradient)	6	0.3	4.9	11
		Quarterly Effluent	8	0.1	4.0	18
		Monthly Orcutt-Solomon Creek at Black Rd. (upgradient)	12	<0.1	1.8	8.9
		Monthly Orcutt-Solomon Creek at Brown Rd. (downgradient)	12	2.4	26	45
Nipomo Community Services District	2000-2005	Semi-annual Groundwater [2]	36	1	18	52

1 individual numerical values not available to compute averages

2 parameter measured is Total N

h. Santa Maria Valley Groundwater Basin Data

In July 1995, Water Board staff prepared a report documenting nitrate contamination of groundwater between 1951 and 1995. The report included an assessment of specific groundwater basins in the Central Coast Region and concluded the Santa Maria Valley groundwater basin had significant nitrate contamination. The report indicates the presence of several nitrate plumes in the vicinity of Nipomo and Santa Maria, with nitrate levels reaching 13 and 20 (as N) mg/L, respectively. As part of the 1995 report, staff recommended additional monitoring be conducted to verify trends, and a groundwater nitrate management plan be developed.

i. Department of Health Services Groundwater Data

Department of Health Services collected groundwater data throughout the region. Figure 11 displays the location of all the groundwater monitoring sites in the Santa Maria and Oso Flaco watersheds. Staff evaluated data collected between 1985 and 2000.

Groundwater nitrate concentrations measured on the Nipomo Mesa and within the Oso Flaco watershed were within water quality objectives. Groundwater nitrate concentrations in the Santa Maria Valley were elevated, with numerous sites consistently exceeding the water quality objective of 10 mg/L nitrate as N. Table 8 displays summary statistics for sites with elevated nitrate levels. Figure 11 displays all of the monitoring sites in the project area, and Figure 12 displays the names of sites in the lower Santa Maria Valley.

Table 8. Summary Of Nitrate-Nitrogen Concentrations In Selected Groundwater Wells In The Santa Maria Valley

Monitoring site	Count (n)	Min. (mg/L)	Average (mg/L)	Max. (mg/L)	Sum > 10 mg/L
10N/34W-14E04 S	13	ND	11.7	17.8	10
10N/34W-14E05 S	9	ND	12.1	16.7	8
10N/34W-27L01 S	39	ND	6.4	15.4	7
10N/34W-35C01 S	32	1.8	8.1	12.8	6
10N/34W-32Q01 S	62	0.4	8.5	12.2	7
10N/34W-35P01 S	26	6.9	10.4	13.9	14
10N/34W-35P02 S	31	5.6	8.7	14.2	5

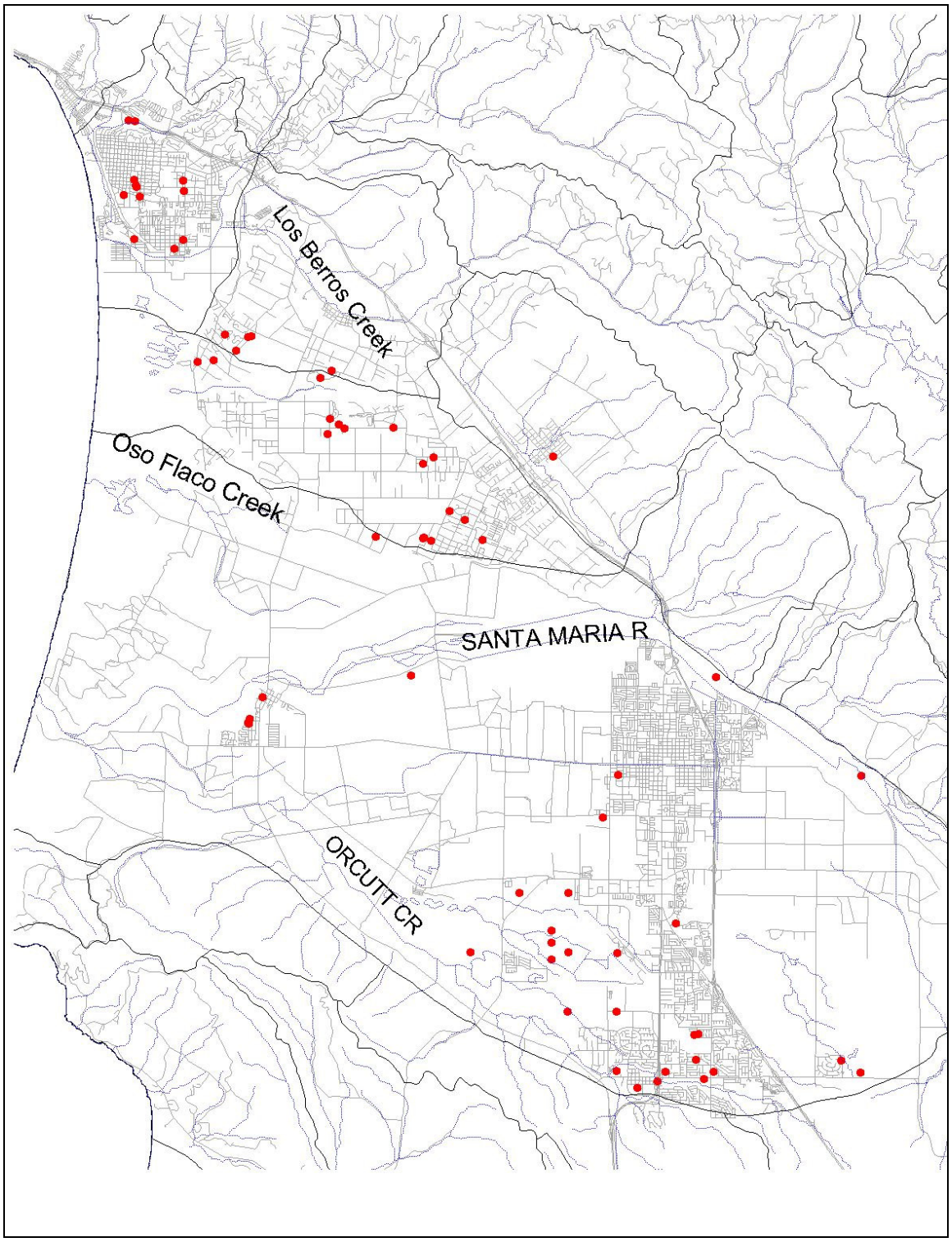


Figure 11. Groundwater Monitoring Sites In Santa Maria And Oso Flaco Watersheds

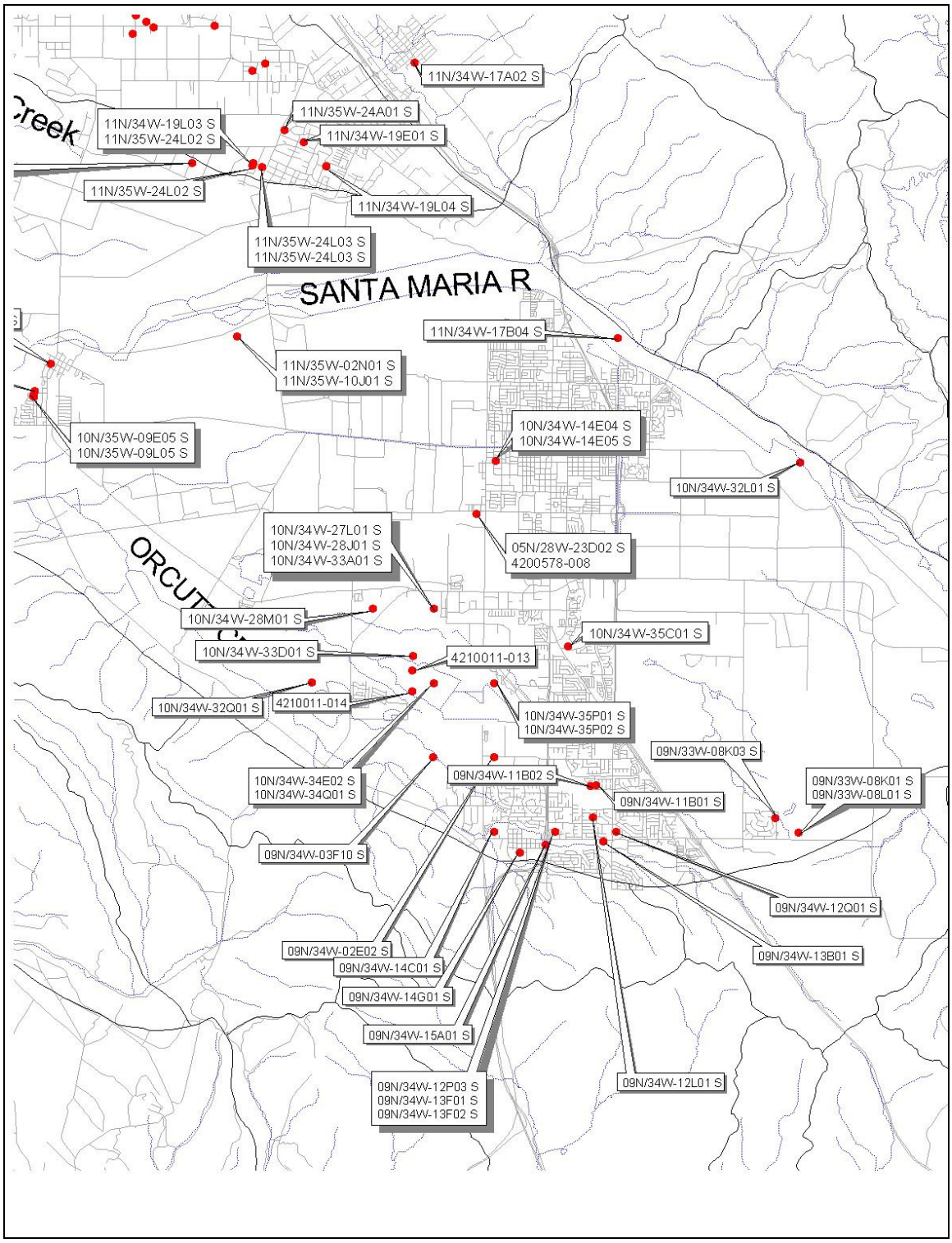


Figure 12. Groundwater Monitoring Sites In Lower Santa Maria Watershed

j. Santa Maria Basin Oil Field Assessment

Komex Inc. prepared a report for the Water Board under the Santa Maria Basin – Oil Field Water Quality Assessment Project (the Project) in accordance with the National Fish and Wildlife Foundation (NFWF) Guadalupe Oil Field Settlement Water Quality Trust Grant. The project purpose was to perform a potential water resources impact assessment resulting from crude oil and natural gas production in the Santa Maria Valley.

As part of the project, Komex Inc. collected surface water samples during storm events and groundwater samples from existing monitoring wells and accessible private domestic water wells. Staff reviewed the data collected and determined the following:

- All surface water samples collected during storm events were below the nitrate water quality objective, and
- Groundwater samples from monitoring wells: South of the Santa Maria River near Sisquoc, GW2 (29 mg/L), Southeast of the City of Santa Maria, GW6 (37 mg/L), Southwest of the City of Santa Maria, GW7 (12 mg/L), and East of Hwy 1 near Orcutt Solomon Creek, GW8 (22 mg/L) exceeded the nitrate water quality objective.

k. Santa Maria Oil Refinery

The ConocoPhillips (formerly Tosco) Santa Maria Oil Refinery is on the Nipomo Mesa approximately 1 mile northeast of Oso Flaco Lake. Staff reviewed a compilation of data collected by Tosco between 1996 and 2000 to determine if there are impacts to the listed water bodies from the refinery (e.g. coke piles, refinery derived landfills upgradient of modern refinery operations). Staff found that nitrate levels (as N) were roughly 2-3 times higher upgradient (19.9 mg/L), in the center of the refinery (19-3 - 22.8 mg/L), and at the coke facility (22.5 mg/L), than elsewhere on the property. Staff considered the upgradient site background to the refinery. The monitoring well downgradient of the facility was lowest (0.53 mg/L) possibly due to upwelling from deeper water escaping upward from a confined aquifer that is not degraded by nitrates.

Staff concluded that the groundwater nitrate concentrations at the refinery exceeded nitrate water quality objectives, however the sources of elevated nitrate concentrations in groundwater were unknown. Additionally, the hydrologic influences from groundwater on the Nipomo Mesa to the listed water bodies within the Oso Flaco watershed were unknown. Air transport was also a potential transport mechanism to the water bodies, but the significance and impacts to the listed water bodies was unknown. Staff was uncertain whether or not refinery operations were a source of nitrate to groundwater or to the listed water bodies (via air transport).

l. Santa Maria Sanitary Landfill

The Santa Maria Sanitary Landfill is located east of the Santa Maria River. The City of Santa Maria takes annual nitrate samples at two storm water discharge points as part of their industrial storm water monitoring program. Staff evaluated annual nitrate data collected between 2001 and 2004. Nitrate concentrations in samples taken from the two sites were variable, with samples averaging 4.2 mg/L. All samples were below 10 mg/L nitrate, with the exception of one sample taken from site SW-1 in 2004. Staff concluded the landfill was not a significant source of nitrates to the Santa Maria River.

m. TMDL Monitoring-

The CRCD, The Southern San Luis Obispo and Santa Barbara Counties Agricultural Watershed Coalition (Watershed Coalition), and Water Board staff partnered to obtain data from groundwater used for irrigation and field runoff from agricultural lands. Quality assurance and control measures followed SWAMP and CCAMP standard operating procedures. The objectives of monitoring were as follows:

- To quantify the differences in nitrate concentrations between groundwater and field runoff from agricultural lands.
- To correlate these data collected with specific management practices, where possible; and
- To utilize these data in combination with the Cooperative Monitoring Program data and Central Coast Ambient Monitoring Program (CCAMP) data to better educate growers about water quality issues in the Santa Maria River and Oso Flaco Watersheds.

Groundwater and runoff samples were taken from two irrigated agricultural fields. Specific samples were named by 1) 312HUA, 2) sample type (ground water, field runoff) and 3) study site (alphabetically) with the following site tags: 312GW-A, 312FR-A; 312GW-B, 312FR-B. The results of the effort are included in Table 9.

Table 9. Summary Of Nitrate-Nitrogen Concentrations In Groundwater And Field Runoff From Irrigated Agricultural Lands

SITE	DATE	TIME	Nitrate as N (mg/L)
312GW-A	3/27/2006	10:00 AM	32
312FR-A	3/27/2006	10:15 AM	47
312GW-B	3/27/2006	10:45 AM	27
312FR-B	3/27/2006	10:55 AM	25

Despite the limited measurements, staff concluded the following about runoff quality in comparison to the groundwater concentrations: nitrate concentrations (32 mg/L and 27 mg/L) in groundwater exceeded the water quality objective; nitrate concentrations in runoff at the two sites varied in comparison to groundwater concentrations with higher concentrations than irrigated groundwater at one site (47 mg/L) and lower at the other (25 mg/L).

n. Case Study: Rangeland management measure implementation monitoring

In the Morro Bay watershed study (National Monitoring Program, 2003), Water Board staff collected nitrate data to evaluate the effectiveness of rangeland management practices. The data demonstrated nitrate in the creek did not significantly change when management practices were implemented. This data suggested that rangeland practices were not a source of nitrate.

4.2. Land Use Data

Water Board staff considered the spatial data required for the following purposes to prepare this report: delineation of watershed boundaries; compilation of land use tables; preparation of orientation maps, and presentation of hydrologic and transportation networks. Staff used watershed areas to describe the condition of the watershed and to interpret the relative effects of land use on nitrate levels. Water Board staff used multiple USGS 30-meter Digital Elevation Models to determine sub-watershed boundaries for the listed water bodies. Water Board staff aggregated Multi-Resolution Land Characterization (MRLC) land use classifications into land use categories. The categories included the following: irrigated agricultural, rangeland, urban/commercial, rural residential, and open space. Table 10 displays land uses by main watersheds and subwatersheds, including listed water bodies. Staff was unable to differentiate watershed drainage areas of the Main Street Canal from Blosser and Bradley Channels, and as such, these are combined.

Table 10. Land Uses In Subwatersheds In The Oso Flaco And Santa Maria Watersheds

Subwatershed	Irrigated Agricultural	Rangeland	Urban/ Commercial	Rural Residential	Open Space	TOTAL AREA
	Area and Percent					
Sisquoc	7,825	82,067	207	556	211,152	**301,807**
	3%	*27%*	*0%*	*0%*	*70%*	
Cuyama	36,042	269,470	769	385	366,720	**673,386**
	5%	*40%*	*0%*	*0%*	*54%*	
Alamo Creek	382	21,467	1	1	35,946	**57,796**
	1%	*37%*	*0%*	*0%*	*62%*	
Santa Maria River	19,785	16,539	621	632	7,894	**45,470**
	44%	*36%*	*1%*	*1%*	*17%*	
Nipomo Creek	9,369	3,458	329	359	985	**14,501**
	65%	*24%*	*2%*	*2%*	*7%*	
Channels (Blosser, Bradley, and Main)	3,377	686	2,564	2,128	581	**9,336**
	36%	*7%*	*27%*	*23%*	*6%*	
Bradley Canyon Creek	4,402	5,317	152	213	930	**11,015**
	40%	*48%*	*1%*	*2%*	*8%*	
Orcutt-Solomon Creek	20,980	25,297	2,575	3,001	5,716	**57,569**
	36%	*44%*	*4%*	*5%*	*10%*	
Santa Maria River Mouth	4	510	1	1	650	**1,165**
	0%	*44%*	*0%*	*0%*	*56%*	
Oso Flaco Creek*	5,980	1,043	142	86	1,801	**9,051**
	66%	*12%*	*2%*	*1%*	*20%*	
Total	**108,147**	**425,856**	**7,362**	**7,361**	**632,379**	**1,181,105**
	9%	***36%***	***1%***	***1%***	***54%***	

** Includes estimated area draining Nipomo Mesa through storm-drain conveyance system.*

Table 10 displays land uses in each subwatershed, including those draining listed water bodies. Open space, rangeland, and irrigated agriculture remained the largest land uses despite continued development pressure from population growth. The Sisquoc and Cuyama water bodies were not listed as impaired (shown previously in Figure 1). According to staff's land use analysis, the Sisquoc and Cuyama watersheds were dominated by open space, with large rangeland components.

Staff calculated nitrate loading based on export coefficients developed by SCWRP and land use information for each subwatershed (shown previously). Staff considered rural residential as low-density urban, and included rangeland in open space areas. The export coefficients are shown in Table 11 and loading rates are shown in Table 12.

Table 11. Export Coefficients Used To Calculate Land Use Loading Rates Within The Santa Maria And Oso Flaco Watersheds

Land Use	(lbs/ac/yr)
Agriculture	15.5
Open Space	1.44
Urban	5.52

Table 12. Estimated Nitrate Load (Lbs/Ac/Yr) From Subwatersheds In The Santa Maria And Oso Flaco Watersheds

Subwatershed	Irrigated Agricultural	Urban	Open Space	TOTAL AREA
Sisquoc	121,283	4,213	422,235	**547,732**
	22%	*1%*	*77%*	**100%**
Cuyama	558,645	6,374	916,113	**1,481,132**
	38%	*0%*	*62%*	**100%**
Alamo Creek	5,915	9	82,675	**88,599**
	7%	*0%*	*93%*	**100%**
Santa Maria River	306,660	6,914	35,183	**348,757**
	88%	*2%*	*10%*	**100%**
Nipomo Creek	145,220	3,797	6,399	**155,416**
	93%	*2%*	*4%*	**100%**
Channels (Blosser, Bradley, and Main)	52,351	25,899	1,824	**80,075**
	65%	*32%*	*2%*	**100%**
Bradley Canyon Creek	68,225	2,016	8,997	**79,238**
	86%	*3%*	*11%*	**100%**
Santa Maria River Mouth	59	11	1,670	**1,739**
	3%	*1%*	*96%*	**100%**
Orcutt-Solomon Creek	325,190	30,780	44,659	**400,629**
	81%	*8%*	*11%*	**100%**
Oso Flaco Creek*	92,687	1,256	4,094	**98,037**
	95%	*1%*	*4%*	**100%**
Total	**1,676,240**	**81,270**	**1,523,853**	**3,281,363**
	51%	*2%*	*46%*	**100%**

Staff included the entire watershed area draining to the Santa Maria River in order to consider the entire contributing land uses to the lower watershed. In a nitrate loading analysis, staff concluded certain areas, particularly the Sisquoc and Cuyama subwatersheds, drained large open space areas and were not likely contributing excessive levels of nitrate. Staff concluded that the source of the nitrate impairment was confined to the lower reaches of the Santa Maria watershed, rather than the entire watershed. Staff considered the load from open space as non-controllable.

The Santa Maria River, Orcutt-Solomon Creek, and Oso Flaco Creek (including Little Oso Flaco Creek) received nitrate loading primarily from irrigated agricultural areas at 88%, 81%, and 95% of the total load respectively. Staff was unable to differentiate the drainage area boundary for the Main Street Canal from Blosser and Bradley Channels with GIS, but was able to determine that both agriculture (65%) and urban areas (32%) are contributing nitrate loads to these water bodies.

Rural residential land uses are likely contributing to nitrate levels, but staff could not draw conclusions from the GIS analysis as to the significance nor the origin of the sources (e.g. farm animals, individual septic systems). Without data or information indicating activities that typically occur on this land use are not significant sources, they cannot be ruled out.

4.3. Data Analysis Summary

Staff evaluated surface, groundwater, runoff, and effluent nitrate data as part of numerous efforts to confirm impairment of the listed water bodies and further identify sources. Staff also evaluated land use information. Staff concluded the following from the information presented above:

Seasonality

- Nitrate concentrations measured at the Main Street Canal, Orcutt-Solomon Creek, Oso Flaco Creek, and Little Oso Flaco Creek were elevated above water quality objectives year round.
- Nitrate concentrations along the Santa Maria River appeared to be higher during the dry season, although exceedances were found during every month of the year.
- Nitrate samples taken by the County of Santa Barbara and by Komex Inc. from Orcutt-Solomon Creek and the Santa Maria River during storm events had concentrations less than the nitrate water quality objective.

Water Body Impairments

- Staff considers the most upstream site on Orcutt-Solomon Creek at Black Road (ORB), a low flowing drainage, as not impaired as it exhibited low nitrate levels year-round.
- Little Oso Flaco Creek is not specifically listed as impaired on the 303(d) list but was impaired; staff will develop TMDLs for this water body.

- Oso Flaco Lake is on the 303(d) list, but is not designated as supporting the municipal use and as such, staff will not develop a nitrate TMDL for this water body.

Water Quality Data Analysis

- Nitrate concentrations measured in urban runoff from the City of Santa Maria did not exceed water quality objectives. Nitrate levels in the North Channel of the Main Street Canal, which received more agricultural inputs, were higher than those measured elsewhere.
- Nitrate concentrations in the Santa Maria River at Highway 1 were lower than samples collected from the estuary. Estuary nitrate concentrations were likely due to substantial nutrient input from Orcutt-Solomon Creek
- Urban storm water from the rural residential area of Nipomo Mesa to Oso Flaco watershed did not exceed water quality objectives; runoff did not occur during dry periods.
- Samples taken from Oso Flaco Creek, and Little Oso Flaco Creek exceeded water quality objectives, but were typically less than samples from agricultural ditches.
- Irrigated agricultural discharges to agricultural drains and listed water bodies occur during both wet and dry seasons.
- Effluent and groundwater concentrations measured by the City of Santa Maria as part of their wastewater treatment plant permit were below water quality objectives.
- Groundwater concentrations measured by the City of Guadalupe were below the water quality objective, with the exception of levels measured upgradient of the wastewater spray field, which rose dramatically in 1998.
- Groundwater concentrations measured downgradient of the Laguna County Sanitation District were typically below 10 mg/l nitrate as N. All effluent samples were below 10 mg/L with the exception of one sample collected in April 2003. Surface water samples collected in Orcutt-Solomon Creek were higher downgradient of the wastewater treatment plant than upgradient.
- Groundwater nitrate concentrations measured by DHS on the Nipomo Mesa and within the Oso Flaco watershed were within water quality objectives.
- Groundwater nitrate concentrations at the Santa Maria Oil Refinery exceeded nitrate water quality objectives; the impacts from the Refinery to surface water in the Oso Flaco Watershed are unknown and as such staff must consider it as a potential source.
- Groundwater nitrate concentrations in the Santa Maria Valley were elevated, with numerous sites consistently exceeding the nitrate water quality objective.
- Groundwater samples from monitoring wells near Orcutt-Solomon Creek exceeded the nitrate water quality objective.
- Nitrate concentrations in storm water samples taken from the Santa Maria Sanitary Landfill were below 10 mg/L nitrate, with the exception of one sample taken in 2004.
- Nitrate concentrations in two groundwater samples from agricultural irrigation wells exceed the water quality objective. Nitrate concentrations in the two agricultural lands field runoff samples varied in comparison to groundwater concentrations with higher concentrations than irrigated groundwater at one site and lower concentrations at the other.

Land Use Analysis

- The Santa Maria River, Orcutt-Solomon Creek, and Oso Flaco Creek (including Little Oso Flaco Creek) receive nitrate loading primarily from irrigated agricultural areas.
- Both agriculture and urban areas are contributing nitrate loads to the Main Street Canal.
- Watersheds that were not impaired (e.g. Cuyama and Sisquoc) contained the largest open space (e.g. shrub, forest) areas. Staff considered the load from open space as non-controllable.
- Data indicated that nitrate concentrations draining primarily rangeland do not contribute significant nitrate.
- Rural residential land uses activities (farm animals, failing individual septic systems) may contribute to elevated nitrate levels, but the significance and origin of the sources were uncertain.

5. SOURCE ANALYSIS

The purpose of the Source Analysis is to identify sources and assist in allocating appropriate responsibility for actions needed to reduce these sources. Water Board staff relied on information presented in the *Data Analysis* section and considered the following:

- Monitoring efforts to determine sources of nitrate,
- Relationships between seasonal conditions and nitrate levels,
- Connections between land use and nitrate concentrations,
- Connections between surface water and ground water, and
- Uncontrollable, natural sources.

This section provides information on the potential influence of land use activities on nitrate concentrations, the influence and uncertainty of degraded groundwater on surface waters, and identifies the sources.

The primary land uses in the project area were irrigated agriculture and urban lands. Several other activities also occurred in the project area. The sources, along with existing implementation and regulatory mechanisms to address the sources are summarized below.

Irrigated Agricultural Runoff

Irrigated agriculture in the project area included farming of numerous crops, such as, celery, broccoli, lettuce, and cauliflower. Drainage infrastructure for farm tail water runoff was comprised primarily of large ditches, which drain to the listed water bodies.

The Water Board regulates irrigated agriculture through the Conditional Waivers of Waste Discharge Requirements for Discharges from Irrigated Lands in the Central Coast

Region (conditional waivers). The permit includes requirements for landowners and operators to implement nutrient control measures and monitoring.

Urban Runoff

The Water Board will be regulating storm water discharge through the issuing of National Pollution Discharge Elimination Permits (NPDES) storm water discharge permits to several municipalities in the Santa Maria and Oso Flaco watersheds. The County of San Luis Obispo, the County of Santa Barbara, and the City of Santa Maria have not previously been required to obtain permit coverage. Upon Water Board approval of their Storm Water Management Plans, they will be covered under a General Municipal Separate Storm Sewer System (MS4) Permit. The General Permit requires the dischargers to develop and implement a Storm Water Management Plan/Program (including nutrient fertilizer management measures). Water Board staff anticipates permit coverage will begin by September 2006.

Several unincorporated areas of the watersheds will be covered in the permit. The County of San Luis Obispo permit will include the Nipomo Mesa and "old town" Nipomo. The County of Santa Barbara permit will include Orcutt. The City of Guadalupe drains to the Santa Maria River, but will not be covered by the first five-year term of the MS4 permit.

Individual Sewage Disposal Systems

Nitrate can originate from failing individual sewage disposal systems. The Counties of San Luis Obispo and Santa Barbara regulate individual sewage disposal systems within the rural areas of the Santa Maria River and Oso Flaco watersheds.

The Basin Plan includes a discharge prohibition from individual sewage disposal systems in the most densely developed portions of the community of Nipomo. The Nipomo Community Services District surveyed and confirmed all residences (about 1000) within the prohibition zone are either connected to the sewage treatment plant or are being required by the Nipomo Community Services District to connect.

The Nipomo Community Services District recently notified over 200 properties within the septic system prohibition area that are not currently connected to the sewage treatment plant, and is planning to prioritize un-sewered areas within the septic prohibition area and expand the wastewater treatment plant collection system.

Rural Residential Livestock

Nitrate sources may include small livestock operations such as those for horses or chickens and other farm animals. Manure from these operations is a potential source of nitrates as well.

Rural residential land uses are likely contributing to nitrate levels, but staff concluded the significance and origin of the sources is not certain.

WDR Permitted Facilities

The Water Board issues Waste Discharge Requirements (WDRs) for several facilities in the Santa Maria and Oso Flaco watersheds. Numerous facilities (e.g. onsite systems for schools, food processing plants) are permitted for discharge to land.

Several of the facilities in the Santa Maria watershed (City of Santa Maria, City of Guadalupe, Laguna County Sanitation District, and Nipomo Community Services District wastewater treatment plants) are authorized to discharge treated municipal wastewater to land where such discharges are likely to percolate to groundwater. Discharge of municipal wastewater to surface water bodies is prohibited. Each municipality is responsible for operation of the collection system. Dischargers will be developing collection system management plans during renewal of their permits.

Permitted discharges to surface waters include water supply discharges, fire hydrant testing, and vegetable cooling (ice melt), none of which are likely sources of nitrate loading to the listed water bodies.

Staff concluded that neither the WWTPs nor the other WDR permitted facilities were significant sources of nitrate to the listed water bodies.

Industrial permitted facilities

The Santa Maria Oil Refinery is located on the Nipomo Mesa northeast of Oso Flaco Lake. Staff evaluated available data and concluded that the groundwater nitrate concentrations at the refinery exceeded nitrate water quality objectives. Staff was uncertain whether or not refinery operations are a source of nitrate to groundwater or to surface water.

Staff evaluated nitrate storm water data collected at the Santa Maria Sanitary Landfill by the City of Santa Maria. Staff concluded the landfill was not a significant source of nitrate to the Santa Maria River.

Rangeland

Water quality data indicated nitrate concentrations draining primarily rangeland do not contribute significant nitrate loads. Staff concluded rangelands were not significant sources of nitrate in the listed water bodies.

5.1. Potential Influence of Ground Water on Nitrate Concentrations

Groundwater nitrate concentrations in portions of Santa Maria River and other subwatersheds were substantially elevated, with numerous sites consistently exceeding the water quality objective. Irrigated agricultural growers often irrigate with groundwater that has elevated nitrate levels. Uncertainties were the origins (e.g. fertilizer, sewage) of the elevated nitrate levels throughout the project area. Furthermore, the impacts of the degraded groundwater to the listed water bodies were not fully understood.

5.2. Source Analysis Summary

Staff's preliminary conclusions were that the nitrate levels throughout the Santa Maria and Oso Flaco watersheds were elevated and vary by season. Monitoring data and a land use analysis confirmed that nitrate was originating from multiple sources. Staff concluded that the following sources were most likely to contribute to impairment of the listed water bodies, in decreasing order of contribution:

- Irrigated agricultural runoff
- Urban runoff
- Rural residential (individual sewage disposal systems and livestock)

Additionally, staff concluded that the impacts from the Santa Maria Refinery to the Oso Flaco water bodies were unknown and as such, staff considered it as a potential source of nitrates to be included in the TMDL.

Staff concluded the following activities are not sources of nitrate to the listed water bodies:

- WWTPs and other facilities
- Santa Maria Sanitary Landfill
- Rangeland
- Open space

6. CRITICAL CONDITIONS AND SEASONAL VARIATION

Staff determined that there may be a pattern of seasonal variation at some water bodies based on the timing of nitrate values exceeding water quality objectives:

- Nitrate concentrations measured monthly at the Main Street Canal, Orcutt-Solomon Creek, Oso Flaco Creek, and Little Oso Flaco Creek were elevated above water quality objectives year round.
- Nitrate concentrations along the Santa Maria River, were higher during the dry season, although they exceed water quality objectives during every month of the year.
- Nitrate samples taken during storm events from Orcutt-Solomon Creek and the Santa Maria River had concentrations less than the nitrate water quality objective.

Critical conditions for this project include the influence of weather and flow (irrigation and storm event driven), but the extent of the influence on nitrate concentrations in the listed water bodies is uncertain. Therefore, recommendations for this project apply during all seasons and address the most critical conditions.

7. TMDL CALCULATION AND ALLOCATIONS

A Total Maximum Daily Load (TMDL) is the loading capacity of a pollutant that a water body can accept while protecting beneficial uses. Usually, TMDLs are expressed as loads (mass of pollutant calculated from concentration multiplied by the volumetric flow rate), but in the case of nitrate, it is more logical for the TMDL to be based only on concentration. TMDLs can be expressed in terms of either mass per time, toxicity or other appropriate measure [40 CFR §130.2(I)]. A TMDL expressed as a concentration is logical for this situation because the public health risks associated with drinking water are not readily controlled on a mass basis. Therefore, staff proposes establishing a TMDL expressed as a concentration for nitrate in the listed water bodies. The TMDL is the same concentration (10 mg/L nitrate as N) as was proposed in the numeric targets section. The TMDL applies in all areas of the tributaries.

The proposed waste-load and load allocations for all *non-natural* sources are equal to the TMDL concentration and focus on reducing or eliminating the controllable sources of nitrate. These sources shall not discharge or release a "load" of nitrate that will increase the load above the TMDL of the water body. Sources in all areas of the tributaries will be held to these allocations.

The allocation to background (including natural sources) is also the TMDL concentration. The parties responsible for the allocation to controllable sources are not responsible for the allocation to natural sources.

The TMDL is considered achieved when the allocations assigned to the controllable and natural sources are met, or when the numeric targets are consistently met in all water bodies.

Should all control measures be in place and nitrate levels remain high, investigations will take place to determine if the high level of nitrate is due to uncontrollable sources. Responsible parties may demonstrate controllable sources of nitrate are not contributing to the impairment of water quality objectives in receiving waters. If this is the case, staff may consider re-evaluating the targets and allocations.

8. PUBLIC PARTICIPATION

In 2006, staff began developing a Stakeholder Plan for this project. Staff anticipates a low-medium to medium level stakeholder involvement, as identified in the Process for Addressing Impaired Waters in California (June 2005). Staff based this determination on the fact that there are few competing interests; committed, formal stakeholder groups; local implementation and monitoring; and adequate time in the schedule. Opportunities for interested party involvement include: providing data and other information to staff, and providing review and comment on the Preliminary Project Report, Project Report, and Regulatory Action Plan (i.e. Basin Plan Amendments).

On September 30, 2004, staff provided an update of proposed TMDLs to the Farm Water Quality Short Course. On March 28, 2006 staff met with agricultural community members to better inform, the Southern San Luis Obispo County Agricultural Watershed Coalition regarding TMDL development and implementation options.

Staff will be notifying stakeholders to communicate project initiation, expectations, request input and gain any additional relevant information; and answer any questions.